

Interviewee: Graham Glick (G)

Interviewer: Peter Sorensen (I)

Date of Interview: 15th February, 2002

Transcription notes: Brief attendance of unidentified female, possibly Mrs Glick, identified as (F).

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I: Interview with Graham Glick at his home in Dianella on Friday, the 15th March, 2002, interviewed by Peter Sorensen. Graham, could you tell me your full name and where and when you were born?

G: Graham Lionel Glick, born in Perth, 13th October, 1930.

I: So which part of Perth did you grow up?

G: I grew up in Mt Lawely, 15 Graham Road. Ostensibly I was named after the road, I don't know. My parents built the first house in the district. Was actually built by Harold Clough's father.

I: Yeah.

G: He's a well known contractor in Perth as you know.

I: Yes.

G: And I went to North Perth school and subsequently to Modern School. And I lived at home until I got married.

I: Okay. So after school you went to TAFE or uni?

G: University of WA, Engineering, five year course.

I: That was civil engineering or ..?

G: Civil engineering.

I: Yeah, okay. And so did you have work experience sort of things while you were doing the course? Or ...

G: Yes, our course was for five years and it was essential that all students obtained holiday work over the three month annual holidays, and our fourth year had to be spent out on work experience. Came back for your final year. That's been dispensed with, probably all too expensive, I don't know, but I thought it was a very good system.

I: Yeah, I think so. It gets people in amongst ...

G: So when you come back to do your final year you've got some idea, you know, where you're ... where you're aiming, what you're aiming for.

I: What was it interested you in engineering?

G: I always wanted to be an engineer. I had an uncle who was a well known engineer in Perth and just had an inkling to do engineering.

I: So he was ..? His name was ..?

G: His name was Sam Myslis, M-y-s-l-i-s.

I: Yeah. So he did projects that are remembered?

G: He was one of the first to introduce reinforced concrete construction into Perth in the early '20s.

I: Yeah, okay. So your first job after uni?

G: First job after university was working with Kellogg International Corporation on the construction of the BP Refinery at Kwinana. I worked there for two years.

I: As an engineer or as ...

G: As an engineer. I did all the soil investigation and subsequent concrete testing and what have you during that two year period. And then I was awarded what was in those days called a British ... a Federation of British Industries Overseas Scholarship. It was the first one awarded to a West Australian engineer. And I went to London for two years and worked with Wimpeys in England.

I: Wimpeys? What do they do?

G: Oh, very large civil engineering contractors. Wimpeys then, W-i-m-p-e-y-s stands for We Employ More Paddies Every Year (laughs).

I: (Laughs) Yeah.

G: Anyway ...

I: But they let an Australian in occasionally.

G: They let an Australian in occ ... I had to learn Irish.

(Laughter)

I: Yeah.

G: In the middle of that I came back to Perth, got married and I went back to London with my wife, to whom I'm still married. A bit unusual these days. And then I was appointed while I was still overseas to senior lecturer in Civil Engineering at University of Western Australia. And I came back to that post in 1957 and I stayed at the University for four years and then I went into private consulting in 1960 and I did that until I retired in 1988.

I: Yeah. So when you were ... when you worked on the Kelloggs thing was that with an engineering company or were ...

G: No, I was employed directly by the Americans.

I: Okay. And when you went into private consulting after university, who was the ... who did you work with?

G: I joined a partnership with a ... an engineer who had already been practicing as a sole consultant for about 10 years called Leon Halpern, H-a-l-p-e-r-n. And the firm Halpern Glick Consulting Engineers was established at the end of 1960.

I: So 1960 you started.

G: And that firm still exists in a form. Around about '64 John Lewis, as I've mentioned, came in as a partner. So was Halpern, Glick and Lewis. Then Lewis retired around about '73, it subsequently became Halpern Glick Pty Ltd because professionals, doctors, architects were not encouraged to form limited liability companies. But the law changed and that was permitted and so we became Halpern Glick Pty Ltd. And that's how it was when I retired. And then a year after that it became Halpern Glick Maunsell which still exists and that's a pretty big firm.

I: Yeah. Okay, so from when you became the consultant then with Halpern Glick, or when you became partner I guess, what was your first project with them?

G: Structural work it was. We did work for architects. There was not much civil engineering work given out by Public Works Department or Main Roads or any of those government departments which had very strong engineering departments or staff of their own, who are very good. So we were basically working for architects. Our main clients were in those days Oldham Boas Ednie Brown, Bennett Allen and Allen, Summerhayes and Associates, Howard Bonner, you name them, and that's what we did.

I: So when you ... your part in that as the engineer, they would come to you with a rough plan or that you would flesh out or they would ...

G: Yeah, well it's much the same today. If a project was being schemed and the architect or whoever was ... builder going to build it maybe who was ... would come to employ the structural engineer to give them preliminary ideas of what the structure would look like, how it would be and all that sort of thing. And that's what happens today. So then you did your bit and there were various other consultants who have increased in time, but there'd be electrical consultant, a plumbing consultant, and air conditioning consultant and that was all part of the team.

I: Yeah. So the costing was done by the architects or the engineers? Someone would work out what it's going to cost for the ...

G: Quantity surveyors generally did it in those days.

I: Yeah, so they were a separate entity?

G: Yeah.

I: Okay, so the architect would sort of design something, you would flesh it out with steel and concrete or whatever.

G: Yes, you'd give them preliminary sizes, thickness of concrete slabs, framing of roof structures and all that sort of thing, yeah.

I: And that's where the quantity surveyor would come in then and ...

G: They would then, yeah ...

I: ... would put a number against ...

G: ... it's different today. And even in the 14 years since I've retired, the whole system of designing contracting has changed immensely.

I: Due to computing perhaps?

G: I never did, no.

I: No. But I mean now with computing is part of it.

G: No, I hate ... no, I ... I've got one here which I swear at every day I have to turn the damn thing on. No, I don't like them.

I: Yeah. As they would play a fairly big part in the industry today would they, in terms of ...

G: Oh yes, tremendously. You don't see a drawing office like we used to have. We used to have drawing boards with either drawing machines, drafting machines, draftsmen,

tracers, you name it, to produce the drawings. Now it's all done and you don't see that anymore, it's all done on computer. It's far more efficient. You get a good CAD draftsman, well it turns out text book, copy book stuff. It looks good, whether it's correct or not I don't ... (laughs). Always looks good.

I: Yes.

G: We had to employ what were called tracers to make it look good. Our draftsmen were often not very good at doing a presentable drawing. So you had ladies or girls as a rule who were called tracers. And you'd give them the draftsman's drawing and you say now make this look a nice drawing.

I: Well you would have, I guess, tables and stuff that says, you know, if you're going this length of steel it must be this big and that sort of thing. But there'd be a certain amount of experience in what they [unclear – overtalking 10:39] you say or the table says that.

G: Well after ... after a while you knew off the top of your head what the sizes were likely to be.

I: Yeah.

G: And design codes were much simpler in those days. They gave the designer a lot more latitude and now it's all very regimented. I'm very worried that students rely too much on what comes out of the computer without knowing what the answer might be at the end. And that scares the hell out of me. And you got to get a nought wrong and they say but there it's on the machine. I said well it might be on the machine but it's not right.

I: (Chuckles) Yeah, or if you look at some of the old buildings, for instance, where they started a big base and as they got taller they came in a bit. Whereas these days they just go straight up don't they, there's no ...

G: Oh yeah, well steels have got more developed into higher strength steels, concrete strengths have been developed over the years and you know, it's partly the reason for these things.

I: Well I think the Empire State had a plane fly into it and it survived it whereas the Twin Towers were, I think they said the insulation they put around the steel wasn't enough or something.

G: Oh, well that was a time bomb. That was well and truly planned. You get a ... an aeroplane full of fuel, it's like putting a great big bomb in the middle of it and I don't believe really any building with that sort of energy about to, you know, catch fire or blow up inside would last very long. The heat would just ... sure, one had to ... well the codes, we did the same thing here with so-called fireproof the steel, but that only allowed enough time for the fire brigade to get there and have a go at it, but if you didn't do it

they would have come down too. Strangely enough timber structures last longer in a fire than anything else because although the wood might burn, it doesn't collapse under the heat.

I: Yeah, strange, because the steel bends and ...

G: Sure, it gets to melting ... yielding point, yeah, lowers the ... the yield point, the heat lowers the yield point of the steel and that ... so unless you concrete encase it or what used to be done, spray it with asbestos which is a naughty word today, there's a lot of buildings still in Perth sprayed with limpet asbestos that have been, or have to ... they've generally been encapsulated in some form of sheathing now to make it safe for people not to breathe in the asbestos fibres.

I: Yeah well asbestos would have had a large part in buildings from that sort of things ...

G: Oh it did, definitely.

I: ... through to ceilings and panels ...

G: Sure. Well a lot of ceilings were sprayed with that asbestos which started to de ... sort of over the years started to flake away and that's where a lot of the danger came about. So the Council House had it, if you remember when they did that up I think it cost them \$4 million to get rid of all that stuff.

I: Yeah. So then they have to put something else in its place.

G: Oh yeah, of course.

I: Yeah. So your first job in the Wanneroo area then?

G: Probably the first job was the Lake Joondalup subdivision for Taylor Woodrow, from memory.

I: So that's the Wanneroo side of the lake.

G: Wanneroo side of the lake, yeah. Eastern side.

I: That would have been late '60s, early '70s?

G: Somewhere in that period, yeah.

I: What sort of things were involved in that?

G: Roads, sewer, water supply. That's what we did.

I: Yeah, so you would have had to work from where ... where those things started or where they currently ended, through to the thing, or you ... you just assume that the ... the water supply is going to bring the thing to the road next to you?

G: Can't recall that.

I: Yeah.

G: I think the water in Wanneroo in those days came from bores anyway, local bores. It wasn't hooked on to the ... onto the current metropolitan system. I can't remember. We would have ... those records would still be in ... in Halpern Glick's office.

I: Yeah.

G: I ... I'll tell you a bit of more ... bit more about that later, but it was essential for any consultant to keep good records. In those early days it was hard because you had large plans which had to take up a lot of space, which took up a lot of space. And then eventually machinery came on the market to photocopy them, reduce them, into microfilm. So then we decided to microfilm a lot of the stuff, keep one film in the office and the other film went down the bank because we were always frightened that you had a fire or something like that, you'd lose your records.

I: Well a building full of paper would be a bit of a risk I guess.

G: Yeah, except if you've got paper in filing cabinets and rolled up tightly, it doesn't burn.

I: Yeah.

G: It's amazing how those ... it might scorch on the outside but it doesn't ... it takes a long time to burn inside. But there are all sorts of things that could go wrong and you had to be sure that the record's were good. Now of course all those records are computerised and on discs and this and that, so where we would have had a room this size full of records, now it's just in a cabinet or on the machine or something. But those records are still available if historians ... it's like going to the Battye Library, imagine what you can dig out. And I'm sure not only my old firm but you go to any of the firms, you'd be able to uncover lots of interesting stuff, but it takes time.

I: Yeah. Someone's got to.

G: Yeah. Got to be prepared to go and do it.

I: Got to know what to look for and ...

G: Yeah, yeah.

I: Yeah, so, things like you would design basically where the roads are going to go, how the roads ...

G: Yeah, there might have been a town planner, he may have ... we ... we may not have, I can't recall exactly what we did, but he probably ... we probably got a plan that showed the roads and the blocks and said well there it is, now you go and look at the site and do whatever earthworks are necessary, site investigation if necessary and come up with a design for the roads and other services necessary to ... to get the blocks saleable. Well they didn't sell the blocks, they put the houses on and sold the houses, as you said. They were a complete developer, and that was an offspring of Taylor Woodrow in London like Wimpeys, you know. Wimpeys was a big developer, Taylor Woodrow is just the same. In fact the other Taylor Woodrow job that I did was when I was still in Perth was City Arcade. And that was in 1968. I remember that 'cause it was the time of the earthquake. And that was another Taylor Woodrow job. That was the old Perth City Council office, you're probably aware of that. And that was pulled down and City Arcade built. That was one of my jobs.

I: Yeah. So the earthquake would have been a reminder to you of construction practices.

G: It's an interesting ... it's an interesting story, that, because we were in the middle of designing the structure and the earthquake hit in October 1968. And one of the key boss men of Taylor Woodrow came out for a planning meeting. And I can recall, I can picture, I can still see sitting there in ... in probably architect's office, I don't know where the meeting was being held. Jeff Summerhayes was the architect. And the big question mark was, here, we've had an earthquake, do we design this building to withstand earthquakes? Because New Zealand, particularly North Island, is well known for having earthquakes.

I: Yes.

G: Anything around that Pacific Rim. And they looked at me and they said, Mr Glick, what do we do? I said well if you design for earthquake, the structure's ... we're going to have to follow a New Zealand code 'cause Australia didn't have an earthquake code, loading code. And they looked at me and said what do we do? And well look, if it was my money I wouldn't bother about it. The wind loading will be adequate. Right, Mr Glick, let's get on with the next question. And they were as quick as that.

I: (Laughs) Yeah.

G: And subsequently proved ... the code writers went overboard and they wrote an earthquake code which lasted for about three years and it gradually got whittled back and whittled back to what it is today and it's no worse than a wind load.

I: Yeah.

G: So was a bit of a guess off my part but it worked out alright.

I: Yeah. Well I suppose they went through a similar thing in Darwin with the cyclones there ...

G: Tracey.

I: ... because everything got flattened there.

G: Sure, we had an office in Darwin at the time.

I: Yeah.

G: And I went up there soon after that earthquake. And the devastation was great. But the main buildings in the city that were properly designed were there. Our office was still there. But our engineer lost his whole house and everything. He was living out the back of his car. And went and put a tent up in the bush so that he and his family could live until they got some accommodation. But the houses were badly done. And then they brought in a code to cover housing in that area and in a funny sort of way, a lot of people suffered. It did a good job cleaning up a lot of crap that was in Darwin.

I: The code would have been whittled back a bit over the years probably.

G: Could be, I don't know. Could well be.

I: The longer it is from a serious event ...

G: Yeah, that's right (chuckles), yeah. It's a pendulum, swings like that.

I: Yeah, well the ... the money people have ... start to ...

G: Yeah, put pressure on, that's right.

I: (Chuckles) Yes.

G: Well life's like that isn't it? When there is any form of catastrophe you tend to go to the extreme in the opposite direction and gradually you ease your way back again.

I: Yeah. So what other things do you remember about the Lake Joondalup site then?

G: That was it. That was that job, I think ...

I: Sewerage and things like that.

G: Oh, as I said, we put in the sewerage plant. I'm not sure where the water came from. We might have put a water bore down, up the back somewhere. I can't remember that..

I: So sewerage plant.

G: Was at the bottom on the lake.

I: Oh, yes.

G: Everything gravitated down there, was called a package plant, activated sludge plant which you just bought from ... off the shelf virtually. It didn't take up any more room than this room here. And that was operated by the council.

I: Yeah. Was that land at all swampy? That was just plain ...

G: Was on the edge of the lake.

I: Yeah. So there's ... yeah. That's ... so it was ...

G: There's probably photographs of it somewhere around.

I: Yeah.

G: Yeah, if you dig into archives.

I: Yeah. You didn't have to worry too much about water in that area though. It was ...

G: No, oh no, no, no. The subdivision wasn't swamp. We didn't have to drain anything.

I: Yeah.

G: Well other subdivisions up around Armadale, yeah, we've had to do drainage work, sure. No, not there.

I: Yeah. Okay, so ...

G: It's all pretty sandy I think around there, from memory.

I: Yeah.

G: Limestoney sort of countryside.

I: Okay. So other projects you've done up that way, did you do any for the City of Wanneroo at the time or was it mainly private?

G: We did some for City of Wanneroo, I can't recall.

I: So breakwater or something?

G: Well, there was all that ... that Two Rocks stuff, yeah. But that was for Bond, it wasn't for the City of Wanneroo.

I: Yeah, okay. So ... so Bond would have been your major development.

G: Yeah, it was funny how we got into that thing, and this is in the late '60s. I don't know the exact date, I could go back to the records and find out, but (pause) ... a contractor actually came, I think his name was Davis or Davies. Dapper little fellow came in one day and he said we've been building a little breakwater at Wanneroo. You would know the one, where the caravan park is, just as you get out of Wanneroo going towards Two Rocks. And he said ... and I'd been working for Bond doing other structural work before this. Bondy decided that he'd ... he'd go and get and start building this before he got any approvals for it, and the Harbours and Rivers or whoever it was in those days stopped him. So we've got (chuckles) we've got all this rock out in the sea with no road properly there and ... and we got to finish it off. And they've said you've got to get an engineer to do the job properly. So I went up and had a look at it and there were these, it wasn't a very big groin. Have you ever been to that groin? It's just north of Wanneroo.

I: Yeah.

G: Probably all the roads have changed around there now and ...

I: Burns be ...

G: There's a caravan park there and a hotel or something.

I: Burns Beach is it?

G: No, no, no, it's ...

I: That was before

G: ... it's further north than Burns Beach.

I: Yeah. Oh ...

G: Malaga, no, that's not ... that's not ...

I: Mindarie?

G: I'll think ... no, it's ... it's Wanneroo. Anyway, we ... we came up with a ... I went up there with my engineer that was in charge of civil, a fellow called Mark Wolfenan, and ... and a young engineer called Michael Parker that must have been just out of school, that we employed. And the three of us looked around this, and we ... we decided where a road would come through the sand dunes down to this thing he was building. And it so happens that that Michael Parker worked with us for a number of years. He's been with the Water Corporation for a long time, but his wife, Rosemary, has been the librarian helping Glick Maunsell's office for ... for many years. And it's funny how that association exists, still exists because when you rang up the other day I went into Rosemary and I said Rosemary, you know Mike worked on that ... that job, what year was it? She said well that was before we were married, it must have been back then. And that's how I know roughly when the time was. It's funny how these things link together. Then Bondy said we're going to challenge America's Cup. I said what in the bloody hell's America's Cup? No-one knew about it. He said oh, it's a big boat race and I'm going to have a go at it. And we have to build a harbour, special harbour so we got the boat, the training and this, that and the other. Find us a suitable site. So Mike Wolfenan and I walked all along the bloody beaches from north of Wanneroo all the way down looking for a suitable site to put this harbour. And we came to the conclusion that Two Rocks was the place. There was nothing there, only the two rocks. So we put up a scheme to Bond. A plan was drawn up and it ... are we finished?

I: Will just turn the tape over. Thank you.

[26:54 – 31:40 - blank]

G: The plan was drawn up.

I: Yeah, hang on, just ... (pause). Yeah. Okay.

G: A suggest ... and a plan was drawn up of a suggested harbour with breakwater and everything that went with it. The requirement by the government of the time that Bondy's land, because he acquired all that land into do the Two Rocks subdivision eventually, was got to be, I don't know, a kilometre, two kilometres back from the sea front. And we argued that that was not necessary because they said oh, it's all going to erode, you know, the ... when you build your harbour we've got to allow for erosion of the coastline. Anyway we convinced the powers that be that that was not necessary and I think his boundary was brought back to within a half a kilometre or something like that of the coast. Anyway. He had a 2IC in those days called Clive Harts who you may have heard of. He went off on his own some years ago and has been a developer around Perth. They liked our plan and it was the most upmarket process of PR and salesmanship I've ever seen. They took the plan and they produced a glossy brochure, or it was a thick ... and it wasn't just a brochure, it was a booklet of the plan and the this and the that, you've no idea. And I can recall going to a meeting, it might have even been in our ... no, it was in Bond's office, in his boardroom, with Harts and us and every government department you could imagine sitting around this table. And Clive Harts developed the thing. I think

he even had slides. We didn't have videos and things in those days. And he ... everybody had this very glossy publication in front of them and they're all thumbing through this. And Clive tells us what about ... he floored them, he really did. So without any ado and of course we didn't have environmentalists and all the others that ... people that we've got today, on the spot they approved it. They said right, go ahead, bloody good job, fantastic. I would think a copy of that ... that submission must be around somewhere, in a ... in an archive or in Bond's rec ... I don't know. But it ... it was the first time I'd ever seen a marketing procedure like that. So then we ... we were asked to go ahead and do the detailed design of that Two Rocks marina, which had a lot of interesting features attached, a lot of new features in it that hadn't been done in WA before. Because Bond was a very innovative person. I got along with him well. When he used to tell me what he thought I should do I told him to get lost, and we did, you know, what we had to do engineering-wise. But he ... he had a mind like a can of worms, you know, it was, oh, it was amazing. And he still has I suppose.

I: Yeah.

G: So that's how it came to be, and ... and the breakwater was built, the jetties were built, the boatsheds were built. Then the subdivision came, the big wall which is an unusual wall that I designed was built. And every ... all the shops and ... I haven't been up there for years so I don't know ... then ... then Atlantis was built, it all sort of grew.

I: Yeah. So the ... who did you actually ... you dealt with Bond to some extent.

G: Mainly.

I: Yeah. And others in BondCorp?

G: Beckwith, there were the three of them. There was Beckwith, Clive Harts and Bond, they were the three guys.

I: So they're the ones you dealt with.

G: Basically Bond.

I: Yeah. Yeah. And in the council? Did you deal with the council?

G: No, we didn't have anything to do with the council.

I: So that was Bond's problem?

G: Yeah, I can't recall.

I: Yeah, so ...

G: They didn't figure very much. I think they were glad to have something going up there (laughs).

I: What about Rivers and Harbours?

G: Yes, they had to approve everything, Harbours and Rivers, yeah.

I: Yeah, so that was every step of the way.

G: Well it was interesting with the Harbours and Rivers because we had to do these jetties for pleasure boats.

I: Yeah.

G: And there were three over on one side for fishing boats. And up 'til then, if you went around the marinas and boat ... and yacht clubs around Perth, all the jetties were built out of timber, of a style that they've done from the turn of the century. So I decided that that was old hat, we'd come up with a modern design with one steel pile and walkway that went across the top. And ... and that case it was actually a steel truss walkway with precast concrete decking on the top of it. And when we put this up to the Harbours and Rivers they said you can't do that. I said why not? They said we've never built a jetty like that, certainly on one pile, it's got to have two. I said well I don't believe it does need to have two. They said well prove it to us. I said alright. And John Hollands were the contractors for that. And they had a big work boat there, massive great big powerful workboat. So what we'll do, we'll tie this bloody boat onto one of these things and it can go flat out and if it can't pull it over, it's alright. They said that's fair enough, and that's what we did.

(Chuckling)

I: So very pragmatic approach to it.

G: Well, I mean, load testing is an acceptable way of engineering approving things when you can't really do it by calculation or by convincing somebody that you know what you're talking about.

I: Were they the floating ones that ...

G: No.

I: No.

G: No, they came later. They were not available in Perth at that point in time.

I: So it hinged from the ... the shore and then you had ...

G: No, it was fixed from the shore. It came down a bit of a slope and was no hinging, no nothing, it was just hooked on.

I: So it's fixed to the shore and then you have one pile out there with it sort of fixed to that.

G: Well a series of them running out to a jetty-head or something at the end, yeah. Then we did several others like that. We did Fremantle marina, Fremantle Sailing Club was another one of ours, was based on the same thing. But we refined the design of the jetties, still on one pile. And that was a pre-stressed deck unit we used which Humes plagiarised, pinched our design because it was good. Couldn't stop them doing it. The ... the steel work was coated in those days with a very good product called coal tar which then got banned because they reckoned it was carcinogenic but the best stuff that was ever invented for protecting steel in the sea. It was cathodically protected which I think was the first cathodically protected jetty in WA, by a guy called John ... (pause) Mac, I'll think of that in a minute. My memory for names is not too good. And he's still operating.

I: That's a protection that's done in a ...

G: Yeah.

I: ... workshop.

G: No.

I: Before it's [unclear – overtalking 39:36] or that's a ...

G: No, no, it's ... it's like boats where you have aluminium corro ... what are sacrificial anodes. And these were placed in the sand hills and all wired up. So that instead of the steel corroding away, the anodes corrode away and that was guaranteed to last at least 10 years. They were probably replaced once, I don't know. But you know how things get forgotten about (chuckles). But you know, when you see boats, they have these aluminium ingots screwed to the side? That's a sacrificial anode to stop the hull from rusting.

I: So the actual sort of polarity comes from the surface ...

G: From the different metals, yeah. Yes. You can do it also by impress current, that's another way of doing it but it's ... these were done by sacrificial anodes.

I: Yeah. And ...

G: So there were a lot of innovative stuff done there. And that big retaining wall, if you recall, I don't know if you remember it ...

I: I seem to recollect a very tall ... yeah.

G: It was made out of big chunky ... I said we're not going to do a mundane ruddy retaining wall, I like these big chunky bits. So Bondy said that looks great. So that was built and it was ... the mortar in there, it had no cement, it was what was again an innovating thing. Saved a lot of money using what was called ground blast furnace slag and sand instead of sand and cement. It's still, I assume it is. So there were lots of ... lots of thought went into producing something that would work, that would look good, that was cost effective and towards the end of it then I don't know whose idea it was to put Atlantis there, so we had to design that. And those pools were freeform, they're not regular, they're not ... so they were built by a process called shotcreting where the ... the mortar, it's a very strong mortar is shot on. They don't use it any more now, I don't know. But there was a company called Shotcrete and that ... the dry ... the dry mortar was shot through a hose and a nozzle by a big compressor and mortar was injected at the nozzle and the guy ... and it stuck like mud, and that's how they did it. And that's how Neptune was built.

I: That would be built up as a layer at a time?

G: As layers. Oh, yes it could have been done in several layers, in fact a lot of swimming pools around Perth in those days were all done by shotcrete.

I: There'd be a limit to how thick you can make it ...

G: Yeah, would slump off.

I: ... at a time.

G: Yeah. Well, I can't recall whether we did it all in one or not now, sure. Might have been done in layers, I don't know, can't remember.

I: Did it ... just get back to the wall for a minute. How tall was that, do you remember?

G: Oh, maximum height was probably about four or five metres, which is a pretty big wall, and very long and it had walkways going up and steps going up.

I: So it'd have to go back into the hill quite a bit for it ...

G: Well, we didn't do that. I reckoned that if we leant it backwards, we worked it out because otherwise it would have been a hell of a lot of rock required. So it's really leaning back onto the sand. It's quite an innovative design.

I: So it's not a vertical wall, it's ...

G: No, well, you'd never build a retaining wall that height vertical because even if it was vertical it would like it was falling over. You've always got to give it a slope in the front. The Greeks learned that two, three thousand years ago.

I: Yeah. It's the optical illusion.

G: It's the optical illusion, that's correct, yeah. So there were all these things that ... that had to be done and thought about and generally done quickly. You couldn't muck around.

I: Well not with Bond.

G: Not with Bond, no, it had to be done tomorrow.

I: Or better yet still yesterday.

G: And I must admit he paid. We never had, and I must say that in his defence, we had no problem getting paid from his ... maybe because we performed, I don't know. But he used to cart me around to other things. Out at Tranby Park, around here, what do you think of this, Graham? What do you think of that? What do you think? I ... I got ... had a good rapport with Bond. Until he then tried to cut our fees. I said no, Alan, I'm not coming down in fees, so we went off somewhere else.

I: Yeah. So Atlantis was the next stage then.

G: Yeah.

I: With Atlantis, did that actually join into the sea or was that ...

G: It had a pump station that pumped sea water into it, yeah.

I: It wasn't ...

G: Atlantis itself doesn't join into the sea. It might now. They changed it and they put extra dolphin pools in or something, but the original one didn't join into the sea.

I: Okay, so ...

G: And it had a ... it had a filter plant. We ... we had a sea intake or somehow, I can't remember the detail now, but it was sea water that pumped in and filtered.

I: Yeah. Okay, so ... the size of the pools would have been worked out on the basis of what's practiced somewhere else?

G: Yeah, I don't know who fixed that.

I: There were quite a few ...

G: He probably had some sort of marine people, I don't know. I don't know. We were ... we were, see there it is, we want this shape, we want this, we want this size, the steps that had a viewing window that had to be built in so you could look through underneath and all that sort of thing. Little ... there was a little, well, covered, we'll call it a grandstand, whatever it is there. But it's ... there was also an aquarium with big glass windows that you walked around. But whether it's still there or not I wouldn't have a clue. And then they came up to this guy, Mark le Buse or whatever his name is, Bondy came up with this statue, it's about this big, of a Neptune and he says now, we want that as a great big statue. I said oh gawd, how are we going to do that? We can't do that out of limestone. So I thought oh well we'll make a ... a steel structure and to get all the shapes we then sort of put mesh and wire netting and stuff around it. And then we had a, if I recall, a plasterer to put a sort of a ... to make a sort of a formwork and then we had the shotcrete people come in and shoot it. And that guy was there while they did it with his trowel and he was trowelling bits off and putting bits on. He actually did the sort of the finer profiles. It was all very interesting.

I: So that was sort of done live, as it were, as the concrete went on.

G: Live. It was done live.

I: He shaped it.

G: He shaped it. We had the basic shape obviously, but he did the final shaping to what he wanted, yeah.

I: Yeah. 'Cause he had to get that before the concrete set.

G: Oh yeah, yeah, sure he did.

I: Okay.

G: He had about half an hour or so to do what he had to do.

I: So you had, sort of, the wire and everything in place as the reinforcing ...

G: Oh yeah, sure.

I: ... so the shotcrete sort of ...

G: Yeah.

I: ... pushed in through the wire and ...

G: Well I think I said I think we had a plasterer to render that wire to give a, like a formwork, a backing, a rough backing, a rough shape. I can't remember now, it's too long ago. If you chopped a bit off you'd probably see it.

I: (Laughs) I don't think that would prove it. Mind you, it's probably been done, but ... (chuckles).

G: Well I have not been up there for years, because then the Japanese bought it or something didn't they, and I've not been ... I used to take visitors up there 'cause I like the ... in the early days, I liked the dolphin performances, but I wouldn't have been there for 20 years. So ... so that's there now I've no idea. Whether it's still rusting ... whether it's rusting, falling to pieces, I wouldn't have a clue, no idea.

I: Yeah. There ... there is a move now to have the ...

G: Help yourself to a biscuit.

I: ... have the King Neptune declared a ...

G: Heritage.

I: Yeah.

G: Yeah. Oh you tell ... you told me that on the phone.

I: So that ...

G: I wouldn't have thought 30 years was a heritage thing, but there you are.

I: Well ...

G: In the life of Two Rocks it is.

I: Yeah. Yeah, in terms, I suppose, of the development, it's ... it may be nothing at the moment but in sort of 100 years time, that was something that happened.

G: Well I believe that limestone statue ... that limestone carving from which it was modelled still exists in Halpern Glick Maunsell's office. I spoke to Rosemary the other day and she said yes, I've seen it around. I'm sure it's still there. So I believe that either tabs should be kept on it if you're going to make it a heritage thing ...

I: Yeah.

G: ... and either council office to take it off Halpern Glick and put it in some museum piece, or it should be assured that if they want to part with it, that it's looked after somehow or other, because that's what it was modelled on. And that guy carved it.

I: Yeah. How ... how did you go about actually constructing the thing? You sort of start with rings of steel or ...

G: It's got a door in it. You can go inside and have a look from the inside if you want to. Maybe the hinges are all rusted up. May need a blowtorch to get in there. 'Cause I think it had a fountain around it, bubbling and what have you and there must have been some pumps and what have you. It was fairly simple structure, it's ... but obviously we had to build something that ... on to which you could shoot the concrete because once that was all finished, it was pretty strong in itself. But we had to put a framework up there that you could shoot onto.

I: Yeah. You obviously had

G: You couldn't pour it with conventional concrete.

I: No.

G: You couldn't form it. It had to be shot on or plastered on or something. Or rather than plaster it on, the shotcrete worked very well.

I: Yeah. So you'd have had to have a cherry picker or something for him to work from, or ..?

G: Oh, didn't have cherry pickers in those days, no. Probably a bit of scaffold or ladders and some planks.

I: And some people to shift them quickly.

G: I can't recall what the trident's made out of. Probably a bit of stainless steel. I can't remember that.

I: Were there any problems in the design of Atlantis itself in terms of ...

G: No, not that I can recall.

I: Yeah, the things like viewing places were all fairly standard procedures by then.

G: I don't know whether he had an architect, I can't recall. I think I told you that there's something like 200 pages of records of this in the old office. Did I mention that the other day?

I: You mentioned there were records.

G: There's a lot of records. Whether ... and I think Rosemary said that she gave me the number of pages. So if the council wanted to get copies of that, it could be arranged with my ex-partner I would think, to get copies of that.

I: Yeah. Yeah, I think they ... they may want to have some copies of some ...

G: When I spoke to Ron Nguyen the other night ...

I: Yeah.

G: Now you know Ron Nguyen.

I: Yes.

G: And that's how you got onto me.

I: Yeah.

G: I haven't spoken to him for 25, 30 years because he was one of my best draftsmen, but he left after that and he told me, I'd forgotten, but he told me that he was actually sent up there to supervise construction, like a site supervisor. And I can vaguely remember that now. So he knew a lot of the detail that I'd forgotten. So we had a fairly long chat and I've not spoken to him or his wife, Mary, for you know, as long as I just said.

I: Yeah.

G: He was a very quiet spoken, quietly spoken, unassuming sort of a guy and he probably still is today. Very good what we called a design draftsman in those days. And that's ... that's all I can tell you about it.

I: So the draftsman handled the drawing side of it. You would ...

G: Well we had what were called design draftsmen. So the engineer would do the basic design, but there'd be lots of infill details required. Connections and bits and pieces that hung on or part of the structure.

I: So you would draw a rough sketch.

G: You would do ... yes, well he might draw the rough sketch or you would do it freehand. And then after that design was done you'd give it to you design draftsman and he'd draw it and fill in all the bits and pieces, the nuts and the bolts, you know, he's the nuts and bolts man really. So he was a very important fellow.

I: Yeah.

G: Because if he didn't put the right number of nuts and bolts in, it fell apart.

(Laughter)

I: Yeah. So from your point of view, you were perhaps more of the artistic side of it in sort of figuring out what it was going to look like and ...

G: That's right, yeah, that's right.

I: And a rough idea of what went behind it.

G: Yeah. Well that happened a lot in those days because then architects would come in and say we want a grandstand, or we want something around here that was not just a structure to a building that was going to be covered up by bricks or concrete or stone or something of that sort. And if the structure was to be visible like a cantilevered roof, I would say well, we're going to shape it this way, we're going to do this, we're going to hold it up like this, we're going to hold it up with ... with string or cables or prop it or ... and that ... that was all part of the discussion and the development of the design. 'Cause there was a very interesting one that's still there that I did, oh, long before this, was in the early '60s, which is the roof to the ... the Anglican, or the Church of England cathedral in Geraldton. I don't know if you know that building.

I: No.

G: An interesting building. Ed Whittaker was the architect. A funny shape with a funny roof and he wanted a certain theme. So we actually, well I actually did it myself. I made a model of this thing, which was about the size of this table, in the back of our office out in the carpark, and we loaded it up with bricks and I said to the architect, well you know, here it is, this is what it's going to look like. He said well oh that's fair enough. And was such a funny shape, Geraldton Building Company was building it, and it had to be built with a temporary prop or column in the middle to hold it all up 'til it was all in place. And there were bets going on. And I was there at the time, there were bets going on that when they took that prop out the whole bloody thing was going to fall down (chuckles).

I: But it ...

G: Which it didn't, and it's still there today. But these are the things that went on.

I: Yeah. So there'd be a shortage of volunteers to take the prop out.

G: (Chuckles) We took it out very ... very slowly (laughs).

I: I believe ...

G: But I mean that's ... that's ...

I: ... it would work, but ... (chuckles).

G: ... that was the interesting part of engineering because I think anybody that is an engineer, architect, any ... any designer, doesn't matter what is ... they are creative in a way, in all different ways. And they like to see the end product. Unlike a theoretician, that's why I gave up lecturing because oh, it was interesting but after a while I got bored with going through the same lecture and I got an, oh, another class, I got to start here and I got to go through there and you didn't see ... all you saw was a few guys going out the end of the classroom in ... in November when they had their exams and that was it. You saw nothing for what your work was. Later on, these guys popped up as practicing engineers and you'd say oh God, yeah, I lectured that guy, and that guy. But it's not the same satisfaction as actually producing something that you see built. And I think that's what gets them in.

I: Yeah.

G: And you get ... I sort of was on the design side all my life. I never went into construction. Other engineers actually didn't like the design but they liked to be on the building side of it. That was the challenge. How do we get this up here? How do we do that? How do we meet the deadline and all that. And that's the other side of ... of construction.

I: Yeah. So that's as much as anything a personality thing.

G: That's a personality thing, yeah.

I: Yeah.

G: Not only that, it may also be ... it's partly that or it could be your destiny is governed often by the first jobs you get.

I: Yeah, what do you ...

G: So if you start off in ... in design, it's very hard then to go back into construction because you haven't got that initial training. And if you start in construction and you're doing that for two or three, five, 10 years, you can't get back into design, you've forgotten ... you've got out of the habit. So, you know, you're channelled often. But it is ... it is a personality thing, yeah, character, oh sure.

I: Yeah. So you hope that your personality works right the first ... on your first job.

G: You got to be bloody lucky, yeah, I know. But in those days, see I started work in 1952, if any student went through university and got a degree, that was a guaranteed work ticket.

I: Yeah.

G: Today it's quite different.

I: No, they push too many through now.

G: Oh, well, that might well be, I don't know quite why, but I don't know of any graduates for a number of years in any faculty, law, whatever it was, that were out of work. So it was a bit of luck, what your first job was going to be. Well I was very lucky because when I did my final year exams which were around October, November, October, I'd taken a special interest in an early science in those days called soil mechanics. It's now called geomechanics which is foundations testing soils, this, that and the other.

I: I'll start another tape.

G: I'm using up too much of your time.

[58:55]

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G: And, well, I was then wondering what job I was going to get. And one of my lecturers came to me, he was in charge of the university testing laboratory, there were no private laboratories in those days. The university did all the public testing. And he said to me, I've had a request from the American firm Kelloggs who have just been commissioned to design and build this new refinery to employ two or three young engineers specific ... especially those that might have some soils engineers experience and you seem to be the guy. Do you want a job? Do I want a job? I didn't even ask the salary but I can remember it was 900 pounds a year which was a very good salary in those days. So I had to do all the site investigations which were done by drills of a certain style down on site and bring the samples back to the university laboratory where I tested them for the next three or four months. And then I followed on by actually working down there on concrete control and other sorts of engineering tasks that had to be done. So, you know, you wonder where you get your start from.

I: Yeah, it just sort of fell out of the sky.

G: Well on that matter of soil mechanics, when I came back from England after two years there and I worked with Wimpeys in their laboratory doing concrete control ... concrete quality control and soil mechanics also, I thought I would like to do lecturing in those topics at UWA. But it so happened they'd appointed another engineer who worked in the Snowy Mountains construction project previously called Baden Cleve, ahead of me. So that position was filled. But we shared a room together. In those days engineering was down in Shenton House which is still there, with old pre-fabs from the Americans around it. And Baden was a very inventive type of guy, you know, and he said to me one

day ... oh actually by this time he was working on a machine called, or a piece of apparatus for testing soils in situ called a penetrometer which was based on a machine that had been used in Victoria but he modified it. And after I left university and went consulting, he came one day and he said listen, I've now done some ... had a student do some research on this thing and it's pretty good. I want somebody to introduce it into the profession. And I said terrific, Baden, that's just what we need. So I introduced, was the first in WA to introduce it. And it ... called, it's a penetrometer for testing the compaction of sand. And then we wrote a paper together which was delivered to a conference in WA, an Australian engineering conference that was being held in WA at that time in 1964. And that sort of got the thing off the ground. And for many ... then people started to use it. The Water Corporation said it's a load of rubbish, we don't want to know about it, but other contractors liked it. And gradually it became in vogue. And it was called the Clegg-Glick, or Glick-Clegg penetrometer, or the Donger as it was commonly called.

I: (Chuckles)

F: Are you going to swimming?

G: I will in a minute, yeah. And ... (pause) over a period of years, thousands of them have been made and used in WA. The Water Authority after three or four years reckoned it was now pretty good and used it as their standard. And eventually an Australian standard was written which is still in practice today and which we get recognised in that standard of having developed it. And it's now called a Perth Standard Penetrometer or something like that. And one of the original ones that I had here in my garage because I salvaged it when they moved office and it was in the back room and they were going to chuck it out or something, had it refurbished and I've given it to the Master Builder's Association who wanted to have it and they're putting it in a glass case with a bit of screed or something to say that this was the ... I mean a bit of poetic licence here, this was the first penetrometer ever used in Perth. So it's an interesting bit of history.

I: Yeah. You said it was called the Donger. I take it that's something to do with the way it works?

G: Yes, it was a falling weight. You had a rod with an anvil on that rod and the weight in those days, it was ... (pause) 20 pound which is nine kilograms in current language. Twenty pound weight falling two feet or 600 millimetres. And you counted the number of blows to drive this rod into the ground. And depending on the number of blows, you knew whether it was loose or firm or very firm or hard, especially for sand, that's what it was developed for. And that's why it was called the Donger. And you had to be careful that you didn't put your thumb in the wrong place because I know a number of guys that donged their thumb and it was very sore (chuckles).

I: Yeah. So ...

G: That's it.

I: ... it's a very simple concept.

G: Very simple. The advantage of it was, or is, that you get a reading, the contractors get a reading right there on the site, there and then. Whereas previously you had to use other means ... test procedures that took samples, you went away to a lab, laboratory, you weighed it, you dried it, you did this and two or three days later you told the guy it was no bloody good. Well he didn't like that. But with this ... this penetrometer it was right there, they could see before their eyes, oh it was good, it was four blows, six blows, 12 blows, whatever it happened to be, and there was no mucking around.

I: So you'd have a certain number of tests for ...

G: That's right.

I: ... square yards.

G: Then it became necessary, every council said any house pad that's constructed, and they still use it today, there are people that do this regularly, it's ... you've got to have a plan of the house and you take half a dozen shots around to make sure that the compaction's okay before they start putting the concrete pads down. Yeah, the penetrometer's still widely used. There's thousands of them about.

I: Yeah, okay.

G: Well Baden and I ... Baden actually had the basic idea, but we worked together and I was the one that actually introduced it into the profession back in 1962, '63. So it's been there nearly 40 years.

I: Do you have any memories of Two Rocks, problems you had or special things you had to do?

G: No, it was just a long way to drive up there and back. That was about the only problem.

(Laughter)

I: Yeah, you wanted a freeway.

G: Wanneroo Road wasn't so good in those days. There was no freeway. No, I can't recall it. We had no major problems to my knowledge.

I: Yeah.

G: In constructing or building it.

I: No ... 'cause there wouldn't have been the protesters those days ...

G: No.

I: ... like you get these days.

G: No.

I: Yeah. Did you learn anything for yourself from those projects up there?

G: Oh, well you always learnt things, yeah. I can't recall what they might have been. Every ... every job had a learning curve somewhere or other, yeah, sure. Better way of doing things. I mean not everything one does is ... is good or works. Sure, I've had my failures. I'm not going to tell you what they were.

I: But when you look back on it you can see that next time I might do ...

G: Sure, well often you did a job, let's say a structural job or whatever it might have been, that might have been the first stage for future development. And then some years later the architect would come back or the owner would come back and say oh we want to put on this extra few floors, we want to do this, we want to do that and you get your drawings out, have a look and say, gawd blimey, why did ... how could I have ever done it like that? What a stupid way to have done it. I mean, this was all part of the learning curve. So, sure that answers ... you know, that happens. I think most people would be like that if you went back to square one and I don't know what your job was but I'm sure if you looked at some of your early tasks you would think gee, I could do them better today.

I: Yeah. Do you have any particular thing that you're say particular proud of?

G: My family, yeah. I made them but I didn't use concrete (laughs). Yeah, I ... I don't think there's anything world shattering but certain things we did I think, you know, they were great jobs. They were really very good. There's no sort of monuments we ever ... that I ever did that ... that I could say oh well that's ... that's a monument ...

I: But can you point to a particular project and say well that's ... that's one I really enjoyed or really found ...

G: There was one and after I retired in '68, one of the lecturers at Curtin went off on sabbatical for a couple of years and I was asked to introduce a new unit to final year engineering students which was called Integrated Design and Construction. And that was up my alley because it was answering your question, going from design into construction. And unless you've got some idea how things are going to be built, I don't believe you can design them properly because you can be, you know, and I reckon the worst person to design anything is a bloody professor because he might know all the theory but he doesn't know where all the pitfalls are. I'm being ... over-simplifying that, but that's the

way it goes. And I used to tell them ... they asked the same question and I used to tell them this little story and it's something you can't really see, but it ... it probably gave me the greatest satisfaction of any job I ever did. You know the woodchip facility down in Bunbury, well you've heard of it anyway.

I: Probably, yeah.

G: There was a lot of contention about that in the early days, shipping out woodchips and still is about woodchips. Well to load it on to the ships, there is ... well you'd call it a ship loader that sticks out over the ship with an elephant's trunk type thing on it.

I: So a conveyor belt of some sort.

G: With a conveyor belt on it, yeah. And it drops the woodchips into the hole and they move the ship along because it would ... the actual loader is fixed so when they fill one hold up, they walk, what's called walk the ship into the next hold. Well, that's the ... the actual boom that sticks out over the water, is held up by a pulley system which is operated by I think it was a hydraulic motor that luffed it up and down. One day I had a frantic call from Charlie Bunning who was alive in those days. And Graham, we've had a catastrophe down on the woodchip loader. I said what's happened? He said somehow the motor failed, it ran away, then had two great big safety ropes, big thick steel cables that were there first ... especially for this purpose. And as it came clunk down, the thing broke and bent. He said this ... the motor failed, the thing's come down, it hasn't completely fallen down but it's unworkable and we've got a ship coming in in two weeks time. And we want to know how we can get this thing back working, because if it don't, we're going to lose thousands of dollars because we can't load the ship.

So I went and had a look at it and without going to the ins and outs of how it was broken, there was a big firm in those days called Forward Down Steel Fabricators and they were going to ... they were figuring out how they could get cranes in, take this thing down, build a new one, put it up there and all the rest of it. So I listened to all of this and I said well, you're never going to build a new truss in that two weeks, it's impossible, it's going to take you, if you start from right here now and work day and night it's going to take you a couple of months to ... you know, a month or more, it's impossible. They said well what would you do? And I said well, I've thought about it, and these were great big steel sections. If it bent one way on the way down, we can bend it the other way on the way back. How are you going to do that? I said, well what size beams you got? We'll have a lever system with some big 200 tonne jacks. You got some 200 tonne jacks? Yes, we've got those. Okay, well let's do it this way, they say. Well, I said, it's worth a chance, I mean you can't do it your way anyway, so let's give it a go. They said alright, we'll give it a go.

It took them about a week to set it all up. I told them how to do it all. They said right, we're ready to start now, let ... I said I'm on my way, and I went. I said right, start jacking and they had two jacks, one on each side for two sides of this big truss. And they started jacking. And back it came, back it came. It's like getting a bit of pipe over your

knee, if you bend it one way, if you turn it around you bend it back again. And the ... and the break was so clean it's like, you know, a doctor fixing a nice clean break. And within half an hour the thing would be straightened up. I said, right, weld some new pieces in, bang, bang, bang, was finished. And to me, that was one of the greatest things that, you know, I did and you can't see anything. You walk past there now, you wouldn't ... it's still there today, you wouldn't know what had happened, it just all looks the same. But in your own mind, you think well, I solved the problem to the advantage of the client, very cheaply where the alternatives that were being thrown around at the time were impossible. And to me, you know, that's the sort of thing that ... that gives you the satisfaction.

I: Yeah.

G: So you asked me the question, there's the answer.

I: Okay.

G: But as far as buildings go, City Arcade. Other ones, London House was one of mine. We never did any really big buildings, you know, multi storeys, but lots of ... lots of civil structures. Probably the other one that comes to mind was, do you know John Roberts of Multiplex?

I: Yeah.

G: Oh you've heard of him.

I: Well I've heard of him, yeah.

G: Did a lot of work with John. And we did all the work for the Turf Club, the grandstands at Ascot and Belmont were our jobs. He said we ... Belmont is a ... is a wet weather course for the Turf Club and it's lousy, it floods, it's boggy, it's no good, the jockeys ... no-one likes it and we want to rebuild it, re-design it and re-shape it and everything. I said well why are you speaking to me? I said I don't know the first thing about race courses, wouldn't have a bloody clue. He said that's why I'm speaking to you, because we want somebody with a fresh mind because the trainer wants one thing, the jockey wants another, the secretary wants another, the owners want something else and we can't agree. He said we're going to send you to America to study race courses. I said that's bloody nice, thank you very much. And that's what he did, or the Turf Club did.

I: Yeah.

G: In 1973. So I had a very nice three weeks at their expense, going from west to east through all the major race courses in America, looking at what they did, how they did it, one thing and another. Came back, re-designed the course that was subsequently built. I think they've modified it a bit since but it's still recognised as one of the best winter courses in Australia. In fact it was ... word got around at that time, I had calls from

Queensland and from here, from there, you know, how did you do it, what did you do, blah, blah, blah. So you know, these things, you have to approach these things with an open mind. So it doesn't matter if you don't know anything, if you're given enough time to research it out and you've got some sort of experience behind you to know what will work and what won't work, well you can generally come up with a pretty good answer and say what it is. Anyway, that's enough of me rambling on.

I: Okay.

G: My grandson is swimming in an inter-school carnival at the moment I ... I want to go and see how it's going.

I: Okay. Well we'll let you go. Thank you very much for your time.

G: Okay. Well I hope it's been of interest to you.

I: Thank you.

[19:01]

End of recording